KULAGIN, D. I.

"The Annual Course of the Gradient of Electrical Potential of the Atmosphere". Meteorol. i Gidrologiya, No. 7, pp 25-27, 1953.

Depencence of the atmosphere's electrical state upon the dusty character of the atmosphere is investigated. Use is made of material of observations at the Tashkent Geophysical Observatory. The author compares the variation of the gradient of electrical potential and the concentration of dust. Both of these characteristics of the atmosphere vary in a single phase with maximum in winter and minimum in summer. Also conpared are the annual variation of the electrical potential gradient and the variation of the turbidity factor. It is shown that there is a clearly expressed inverse annual behavior of the characteristics under consideration. The author expounds considerations on the role of ascending currents in the atmosphere which change the concentration of aerosols near the earth's surface, leading to variation in the electric field strength. (RZhGeol, No 11, 1955)

SO: Sum No 884, 9 Apr 1956

KULAGIN, D.I.

Atmospheric electrical field in the presence of meteorological phenomena. Trudy Tashk.geofiz.obser. no.9:73-74 '54.
(Atmospheric electricity) (MIRA 8:11)

14-57-6-12038

Translation from: Referativnyy zhurnal, Geografiya, 1957, Nr 6, pp 54-55 (USSR)

AUTHOR: Kulagin, D. I.

TITLE: Electric Field of Atmosphere in Dry Regions with Few Clouds (Ob elektricheskom pole atmosfery malooblachnykh sukhikh rayonov)

PERIODICAL: V kn: Meteorol. i gidrol. v Uzbekistane, Tashkent, AN UzSSR, 1955, pp 281-290

ABSTRACT: Basing his interpretation on a number of his own former studies, the author attempted to establish local causes which determine basic variations in the electric atmospheric field. He cites data acquired by the Tashkent studies on the relation of potential gradient V^1 and atmospheric conductivity λ, to the amount of atmospheric dust (expressed by the dust concentration N), and to the radiation properties

Card 1/2

14-57-6-12038

Electric Field of Atmosphere (Cont.)

(expressed by the opacity factor T_0). It has been established that the linear correlation coefficient between λ and N is equal to -0.86, between N and V^1, to +0.83. The author proposes an empirical formula $V^1 = aN^b + c$, where a, b and c are certain constant quantities. Dust concentration near the earth's surface varies through the year inversely to the turbidity factor. After analyzing the results obtained, the author concludes that widely distributed atmospheric dust layers with highly positive volumetric charges are one cause of the relationships he has discovered. Data obtained by flight observations confirm the possibility that such layers are formed by thermodynamic processes and by advection. He has demonstrated that conductivity and volumetric charges related to the aerosol phase exert an influence on daily and annual intensity variations of the electric atmospheric field.

Card 2/2 N. P. T.

KULAGIN, D.I.

USSR/Physics of the Atmosphere - Atmospheric Electricity, M-

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 36202

Author: Kulagin, D. I.

Institution: None

Title: Certain Results of Measuring the Electric Field of the Atmosphere by Means of an Electrostatic Generator

Original Periodical: In book: Meteorol. i gidrol. v Uzbekistane, Tashkent, AN UzSSR, 1955, 291-295

Abstract: Results are given of several comparative measurements, performed with the aid of a very simple electrostatic flux meter and collector, connected to a Bendorf electrograph. The author thinks that both methods give sufficiently accurate agreement and reflect the variation of the field under the meteorology conditions that disturb the field.

Abstractor's comment. On page 293 [of original] it was indicated in error that the electrostatic generator is connected to the collector.

Card 1/1

85912

S/169/60/000/010/006/013
A005/A001

9,9841

Translation from: Referativnyy zhurnal, Geofizika, 1960, No. 10, pp. 146-147, # 12702

AUTHOR: Kulagin, D.I.

TITLE: The Problem of Origin of an Electric Field in the Atmosphere

PERIODICAL: Tr. Sredneaz. n.-i. gidrometeorol. in-ta, 1959, No. 2 (17), pp. 253-255

TEXT: The results are described of a statistic investigation of the anomalies in the potential gradient of the electric field in Tashkent, depending on the quantity, the altitude, and the main forms of the clouds according to observation materials of the Tashkentskaya nauchno-issledovatel'skaya geofizicheskaya observatoriya (Tashkent Scientific Research Geophysical Observatory) in 1941-1946. From the observed distributions of anomaly frequency of the potential gradient depending on the cloud quantity, distribution polygons were plotted approximated by binomial distribution curves. The estimates of the distortion degree of the electric field, due to cloudiness, were made on the basis of the magnitude of

Card 1/2

85912
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A005/A001

The Problem of Origin of an Electric Field in the Atmosphere

asymmetry of the distribution curves. It follows from the result analysis, that the approximation is good for cloudiness of various intensity of the low, middle, and upper layers (hours with precipitations, fogs, and winds of more than 3 m/sec were excluded from the analysis). However, the distribution curves obtained do not show an increased asymmetry, which points out that the distribution curves approach the normal curves. Consequently, the cloudiness of the regular forms in the intensity of up to force 10 does not distort the electric field near the earth's surface, observed during cloudless weather. The author concludes that the presented results of the statistical quantitative investigations can serve as an indirect indication that the clouds may yield one of the causes of the existence of the electric field in the atmosphere, which corroborates the correctness of the main tenets of the Frenkel theory.

N.V. Krasnogorskaya

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

KULAGIN, F.F.

Problems related to the work organization of the map corrector.
Sbor. st. po kart. no.9:65-68 '56. (MIRA 10:8)
(Map printing)

KULAGIN, G. A.,

"Creative Cooperation with Scientists," Technological Developments at the Leningrad Metal Works imeni Stalin, Moscow, Mashgiz, 1957, p. 298.

KULAGIN, G.A.

KULAGIN, G.A.

The Leningrad Metalworking Plant is 100 years old. Energomashinostroenie 3 no.12:1-2 D '57. (MIRA 11:1)
(Leningrad--Machinery industry)

POTEKHIN, I.I., glav. red.; BARANOV, A.N., red.; BELYAYEV, Ye.A., red.; GELLER, S.Yu., red.; GRAVE, L.I., st. nauchnyy red.; GRIGOR'YEV, A.A., red.; GUBER, A.A., red.; KULAGIN, G.D., red.; MALIK, Ya.A., red. MANCHKHA, P.I., red.; MILOVANOV, I.V., red.; NERSESOV, G.A., red.; OL'DEROGGE, D.A., red.; ORLOVA, A.S., red.; POPOV, K.M., red. ROZIN, M.S., kand. ekon. nauk, red.; SMIRNOV, S.R., red.; UFIMOV, I.S., red.; SHVEDOV, A.A., red.; YASTREBOVA, I.P., red.; PAVLOVA, T.I., tekhn. red.

[Africa; encyclopedia] Afrika; entsiklopedicheskii spravochnik. Glav. red. I.I.Potekhin. Chleny red. kollegii: A.N.Baranov i dr. Moskva, Vol.1. A - L. 1963. 474 p. (MIRA 16:4)

1. Sovetskaya entsiklopediya, Gosudarstvennoye nauchnoye izdatel'stvo, Moscow.

(Africa--Dictionaries and encyclopedias)

KULAGIN, G. D.

KULAGIN, G. D. - "Heavy Industry in Italy After World War II and Its Distribution." Sub 31 Oct 52, Inst of Geography, Acad Sci USSR. (Dissertation for the Degree of Candidate in Geographical Sciences).

SO: Vechernaya Moskva January-December 1952

KULAGIN, Georgiy Dmitriyevich; ZIMAN, L.Ya., otvetstvennyy redaktor; TRUBITSYN, V.I., redaktor; SHCHUKINA, V.V., khudozhestvennyy redaktor; RIVINA, I.N., tekhnicheskiy redaktor; GOLITSYN, A.V., redaktor kart.

[Geographical study of Italy's industries] Geografiia promyshlennosti Italii. Moskva, Gos. izd-vo geograficheskoi lit-ry, 1954. 363 p. (Italy--Industries) (MIRA 8:1)

KULAGIN, G.D.

Geography in Italy. Izv.AN SSSR. Ser.geog. no.4:75-79 Jl-Ag'55. (MIRA 8:10)

1. Institut geografii Akademii nauk SSSR
(Italy--Geography)

MASHBITS, Ya.; KULAGIN, G.; TIKHOMIROV, V.P., otvetstvennyy redaktor; CHIZHOV, N.N., redaktor; NOGINA, N.I., tekhnicheskiy redaktor

[Spain, Portugal, Andorra, Gibraltar] Ispaniia, Portugaliia, Andorra, Gibraltar. Moskva, Gos. izd-vo geogr. lit-ry, 1956. 23 p. (Iberian Peninsula) (MLRA 9:9)

ALAMPIYEV, P.M.; APENCHENKO, V.S.; BEKOVA, T.N.; BYUSHGENS, L.M.; GINZBURG, G.Z.; GORDONOV, L.Sh.; GRIGOR'YEV, A.A., akademik; GURARI, Ye.L.; DANILOV, A.D.; DEMIN, L.A.; DOBROV, A.S.; SHIRMUNSKIY, M.M.; KULAGIN, G.D.; MILEYKOVSKIY, A.G.; MURZAYEV, E.M.; PAVLOV, V.V.; POPOV, K.M.; YANITSKIY, N.F.

Lev IAkovlevich Ziman, 1900-1956; obituary. Izv. AN SSSR.Ser.geog. no.6:153-154 N-D '56. (MLRA 10:1)
(Ziman, Lev IAkovlevich, 1900-1956)

KULAGIN, G.D. (Moskva).

Physical geography of Asia ("Non-Soviet Asia; its physical geography." D.L.Armand, B.F.Dobrynin, IU.K.Efremov, L.IA.Ziman, E.M.Murzaev, L.I.Saprygina. Reviewed by G.D.Kulagin). Priroda 45 no.10:121-122 O '56. (Asia--Physical geography) (Armand, D.L.) (Dobrynin, B.F.) (MLRA9:11)
(Efremov, IU.K.) (Ziman, L.IA.) (Murzaev, E.M.)
(Saprygina, L.I.)

KULAGIN, G.D.

Brief survey of a discussion of this periodical. Izv. AN SSSR. Ser. geog. no.4:92-96 Jl-Ag '57. (MIRA 11:1)
(Geography--Periodicals)

KULAGIN, G.D.

General meeting of the Geology and Geography Section Academy of Sciences of the U.S.S.R. Izv. AN SSSR. Ser. geog. no.4:136-137 Jl-Ag '57. (MIRA 11:1)

(Geology) (Geography)

Kulagin, G.D.

ALAMPIYEV, P.M.; GERASIMOV, I.P.; GORNUNG, M.B.; GOKHMAN, V.M.; ZHIRMUNSKIY, M.M.; KOVALEVSKIY, V.P.; KULAGIN, G.D.; MILEYKOVSKIY, A.G.; NEYSHTADT, M.I.; POPOV, K.M.; PULYARKIN, V.A.

A.S. Dobrov; obituary. P.M. Alampiev and others. Izv. AN SSSR. Ser. geog. no.4:143-144 Jl-Ag '57. (MIRA 11:1)
(Dobrov, Aleksandr Semenovich, 1901-1957)

KULAGIN, G.D.

Conference on the natural history zoning of the Ukraine. Izv. AN SSSR. Ser. geog. no.5:143 S-O '57. (MIRA 11:2)
(Ukraine--Economic geography)

AUTHOR: Kulagin, G.D. SOV-10-58-4-20/28

TITLE: Some Remarks on the Appraisal of the Scientific Principles of Soviet Geography by Prof. Osvaldo Baldacci (Nekotoryye zamechaniya po povodu otsenki Prof. Osval'do Bal'dachchi nauchnykh printsipov sovetskoy geografii)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geograficheskaya, Nr 4, 1958, pp 135 - 137 (USSR)

ABSTRACT: The author criticises the review by the Italian professor Baldacci of the symposium "Voprosy geografii" (Geographical Questions), published in 1956 by the USSR Academy of Sciences on the occasion of the 18th International Congress of Geography in Rio de Janeiro. There is one Italian reference.

1. Geography--USSR

Card 1/1

SOV-10-58-4-23/28

AUTHOR: Kulagin, G.D.

TITLE: A General Meeting of the Geologic-Geographical Section of the USSR Academy of Sciences (Obshcheye sobraniye otdeleniya geologo-geograficheskikh nauk AN SSSR)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geograficheskaya, 1958, Nr 4 pp 143 - 144 (USSR)

ABSTRACT: From 24-25 March 1958 a general meeting of the geologic-geographical section of the USSR Academy of Sciences was held. The agenda of this conference included the election of academicians and corresponding members to the Siberian section of the USSR Academy of Sciences and the report of Academician-Secretary D.I. Shcherbakov on the activity of this section during 1957. Professor V.B. Sochava and V.N. Saks were among the elected candidates. After the reading of the above-mentioned report, the following scientists took part in the discussion: Corresponding member P.F. Shvetsov, Corresponding Member A.V. Sidorenko, Professor V.A. Priklonskiy, Academician S.I. Mironov, Academician K.I. Satpayev, Corresponding Member L.A. Zenkevich, Academician I.P. Gerasimov, Corresponding Member A.A. Amiraslanov.

Card 1/2

A General Meeting of the Geologic-Geographical Section of the USSR Academy of Sciences SOV-10-58-4-23/28

Professor V.G. Bogorov reported on the results of his recent research work, undertaken within the framework of the International Geophysical Year, in the central part of the Pacific. Corresponding Member S.V. Obruchev, Academician N.S. Shatskiy and Academician D.I. Shcherbakov participated in the following discussion. Academician T.A. Trofimuk and Corresponding Member of the USSR AS G.D. Afanas'yev were elected to the OGN Bureau of the Siberian section.

1. Geology--USSR 2. Geography--USSR

Card 2/2

KULAGIN, Georgiy Dmitriyevich; CHIZHOV, N.N., red.; POPOVA, V.I., mladshiy red.; GOLITSYN, A.V., red.kart; VILENSKAYA, E.N., tekhn.red.

[Italy] Italiia. Moskva, Gos.izd-vo geogr.lit-ry, 1960. 91 p. (MIRA 13:6)

(Italy)

KULAGIN, G.D., kand.geograf.nauk

Conference of geographers. Nauka i zhizn' 27 no.6:22 Je '60. (MIRA 13:7)

(Natural resources) (Geography, Economic)

KULAGIN, G. D.

Geography in Great Britain. Izv. AN SSSR. Ser. geog. no.2:99-101
Mr-Ap '61. (MIRA 14:3)

1. Institut geografii AN SSSR.
(Great Britain—Geography)

KULAGIN, G.D.

Geography in Greece. Izv.AN SSSR.Ser.geog. no.3:125 My-Je '61.
(MIRA 14:5)

1. Institut geografii AN SSSR.
(Greece—Geography)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000927320007-1"

VOLKOV, A.V.; KOLOSOVA, Yu.A.; KULAGIN, G.D.; MUKHIN, A.I.; POPOV, K.M.;
PUCHKOV, I.B.; TIKHOMIROV, V.P.; CHERNIKOV, G.P.

Petr Ivanovich Glushakov, obituary. Izv. AN SSSR. Ser. geog.
no.5:151 S-O '61. (MIRA 14:9)
(Glushakov, Petr Ivanovich, 1893-1961)

KULAGIN, G.D., kand.geograf.nauk

Studying the geography of foreign countries. Vest.AN SSSR 31 no.9:138-139 S '61. (MIRA 14:10)
(Geographical research)

GERASIMOV, I.P.; KALESNIK, S.V.; KULAGIN, G.D.; GORNUNG, M.B.

Roberto Almaya; obituary. Izv.AN SSSR. Ser.geog. no.6:145 N-D '62. (MIRA 15:12)

(Almaja, Roberto, 1884-1962)

KULAGIN, G.D.

Main problems in the geographical studies of foreign countries. Izv. AN SSSR. Ser. geog. no.3:107-112 My-Je '63. (MIRA 16:8)
(Geography research)

KULAGIN, G.D.

Second Plenary Session of the Committee on Economic Regionalization of the International Geographical Union. Izv. AN SSSR. Ser. geog. no.6:116-118 N-D '63. (MIRA 17:1)

KULAGIN, G.P.

Main tasks of Soviet geographers in studying capitalist countries. Vop. geog. no.64:3-9 '64. (MIRA 17:10)

1. Institut geografii AN SSSR.

KULAGIN, G. I.

Socialist Competition

Mutual control for outstanding fulfillment of each production operation. Ryb, khoz. 28 no. 7, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November, 1952 ~~1953~~. Unclassified.

KULAGIN, I.A.; RZHONDKOVSKIY, R.P.

Using means of minor mechanization in the treatment-extraction of ores. Khim.prom. no.7:539-542 Jl '62. (MIRA 15:9)

1. Solikamskiy kaliynyy rudnik i Permskiy politekhnicheskiy institut.

(Solikamsk--Ore dressing)

KULAGIN, I.

Kulagin, I. - "Study of the thermal cycle of basic metal during multilayer butt welding," (In the table of contents: Kulagin, D.), Trudy Studench. nauch.-tekhn. o-va (Moscow technical college im. Bauman), 2, 1949, p. 79-94

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949)

KULAGIN, I.D.

B

7

PROCESSES AND PROPERTIES INDEX

Temperature Curve of the Base Metal During Multilayer Arc Welding. (In Russian.) N. N. Rykalin and I. D. Kulagin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 132-152.

Various factors affecting the above were investigated for butt, lap, tee, and cross welds in low-alloy structural steel. Includes extensive tables and numerous time-temperature curves, also schematic diagrams of the weld types and designs investigated.

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION

KULAGIN, I. D.

SA

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

8-67

a

3100. Calculation of the parameters of the thermal cycle of the main metal in the case of multi-layer arc welding. N. N. RYKALIN AND I. D. KULAGIN. *Izv. Akad. Nauk, SSSR, Otdel. Tekh. Nauk* (No. 2) 233–48 (1950) *In Russian.*

A method of calculating the parameters of the thermal cycle of multi-layer welding, governing the decomposition of supercooled austenite in the re-crystallization zone, has been worked out. The cooling temperature of the first welding layer is calculated in accordance with the model of a movable linear source distributed evenly across the plate thickness. The calculated power of the arc includes the reduction coefficient whose values a.-): 1·5 for contact-joint, 0·9 for T- and lap-joints, 0·8 for cross-joint. The model of a stationary flat source in an infinitely long rod (when heat is transmitted) gives a good description of the temperature of the average heating of the seam zone in the case of the continuous welding of strips or sheets in short steps. The thermal coefficients for steel 50, used for the calculation of the cooling temp. of the first layer and of the average heating of the seam zone, can be assumed to be constant during the whole process of heating: they are (*a*) thermal conductivity coefficient λ = 0·095 cal/cm sec °c, and the heat capacity per volume unit $c\gamma$ = 1·3 cal/cm^3 °c for the steel temp. of 450°, (*b*) coefficient of the surface heat loss ranging from 5 to 7·5 × 10^{-4} cal/cm^2 °c, corresponding to the temp. interval 250–320°.

F. LACHMAN

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KULAGIN, I. D.

"Heat Cycle of Base Metal in Automatic Arc Welding." Sub 23 Apr 51, Moscow Order of the Labor Red Banner Higher Technical School imeni Bauman.

Dissertations presented for science and engineering degrees in Moscow during 1951.

SO: Sum. No. 480, 9 May 55

KULAGIN, I.D.

RYKALIN, N.N.; KULAGIN, I.D.

Thermal parameters of the welding arc. Trudy Sektsii po nauchnoi razrabotke problem elektrosvarki i elektrotermii Akademii nauk SSSR, no.2:10-58 '53. (MLRA 7:6)
(Welding)

KULAGIN, I.D.

Thermal cycle of the basic metal during automatic arc welding. Trudy Sektsii po nauchnoi razrabotke problem elektrosvarki i elektrotermii Akademii nauk SSSR, no.2:59-88 '53. (MLRA 7:6)
(Welding)

1. KULAGIN, I.D.; SHORSHOROV, M.Kh.

2. USSR (600)

4. Electric Welding

7. Automatic and manual arc welding of the joints of reinforcement rods in copper forms, I.D. Kulagin, M.Kh. Shorshorov, Avtog.delo 24 no. 4, 1953.

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953, Uncl.

AID P - 5059

Subject : USSR/Engineering-Welding

Card 1/1 Pub. 107-a - 8/9

Authors : Rykalin, N. N. and I. D. Kulagin (Institute of Metallurgy, Academy of Sciences, USSR)

Title : Welding practice in machine-building plants of Switzerland

Periodical : Svar. proizv., 5, 25-32, My 1956

Abstract : The authors report on the various welding practices in outstanding Swiss plants, such as Brcwn-Bovery, Sultzer, including a few plants making structural steel. Twenty one photos and 2 drawings.

Institution : As above

Submitted : No date

Kulagin, I. D.

137-1957-12-24115

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 173 (USSR)

AUTHORS: Rykalin, N. N., Kulagin, I. D.

TITLE: The Heating of the Rotary Electrodes of an Arc Rectifier (Nagrev vrashchayushchikhsya elektrodov dugovogo ventilya)

PERIODICAL: Tr. in-ta metallurgii AN SSSR, 1957, Nr 1, pp 211-227

ABSTRACT: The heat balance of a high-voltage arc rectifier (AR) was investigated within the range of the parameters of the AR system under investigation. The fraction of heat carried off by the water used to cool the electrodes amounts to 10-15 percent of the total arc capacity at the cathode and 20-25 percent at the anode; of the total capacity of the arc the air carries off 25-35 percent from the cathode and 20-30 percent from the anode. The consumption of coolant and air, the rotary velocity of the electrodes and the diameter of the jets essentially do not affect the primary components of the heat balance of the AR. In the process of burning, the arc breaks down into a number of separate strands, through the trails of which the major portion of the heat of the arc is introduced. A method is given for the computation of the temperature of an individual trail; the temperature is calculated as the sum of the

137-1957-12-24115

The Heating of the Rotary Electrodes of an Arc Rectifier

mean temperatures of an electrode surface which has reached a steady thermal state, and of the local temperature brought about by the short-time action of a single impulse of the arc upon the electrode surface. The shape of the electrode was taken into consideration in the computation of the mean temperature, while the computation of the local temperature was based upon the concept of an immobile, continuously operating, normally circular heat source upon the surface of a massive body.

A. N.

1. Electrodes-Thermodynamic characteristics 2. Arc rectifiers-Heat transfer 3. Electric arcs-Temperature-Mathematical analysis

Card 2/2

KULAGIN, I.D., inzh.

Improving the operation of the Gramm-VI 300 h.p. locomobile wet-air pump. Energetik 5 no.12:13-14 D '57. (MIRA 10:12)
(Steam engines)

KULAGIN, I. D.

AUTHORS: Kulagin, I. D. and Nikolayev, V. A. (Moscow) 24-9-15/33

TITLE: Determination of the dimensions of the spots in arc welding and distribution in these of the current density by measuring the electrical field in the electrodes. (Opredeleniye razmerov pyaten svarochnoy dugi i raspredeleniya v nikh plotnosti toka metodom izmereniya elektricheskogo polya v elektrodakh).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1957, No.9, pp.108-110 (USSR)

ABSTRACT: A direct method is described of determining the dimensions of the electrically active spots and the current distribution in these by measuring the current density inside the electrodes of the electric field. The method is based on measuring the difference in potentials between the individual points of a thin plate with central or peripheral current supply; it is assumed that the plate thickness changes so little with the radius that the electric field in it can be considered as a plane one. The data obtained by this method are compared with photographs and with the traces of the arc produced by short duration action of the arc on the electrode surfaces. The experiments were carried out on a special test rig with an

Card 1/3

24-9-15/33

Determination of the dimensions of the spots in arc welding and distribution in these of the current density by measuring the electrical field in the electrodes.

electron-ion control circuit which enabled simultaneous measurement of the electric field in the electrode, to photograph the arc and to obtain the imprints of the arc discharge. The arc was generated without contact between the electrodes by means of a high voltage, high frequency impulse and was continuously photographed on a film during the entire duration arc (about 0.03 sec) with exposure times of 3 to 10 μ sec having a resolution power of about 0.0055 sec. The cathode spot was investigated of a d.c. arc on low carbon steel electrodes with a steady state current of 1100 A and a gap of 10 mm in an argon atmosphere; the cathode consisted of a circular plate of 120 mm dia., 0.6 mm thick with peripheral current supply, whilst the anode consisted of a steel cylinder of 50 mm dia. with a plane front surface (Fig.1); the arc was produced in the centre of the electrodes, the thickness of the cathode plate was 20 to 50 times smaller than the diameter of the arc spot on the cathode. Along both sides of the anticipated spot boundary six probes of 0.3 mm dia. and of the same material as the electrode were welded on

Card 2/3

24-9-15/33

Determination of the dimensions of the spots in arc welding and distribution in these of the current density by measuring the electrical field in the electrodes.

at spacings of 3 mm, which were connected to the loops of an oscillograph. Comparison of the electric field distribution in the electrode with the photos of the near electrode part of the arc column has shown that the light emitting flux of the material particles at the electrode surface corresponds to the region of the electrically active arc spot; the dimensions of the light emitting flux in the photographs are the same whether the photographs are taken without a filter or with a yellow or blue filter. It was found that the dimensions of the arc traces on the electrode surface (erosion or melting off zone) correspond to the dimensions of the electrically active spot only at the initial stage of the discharge (Fig.4).
There are 4 figures and 4 references, 2 of which are Slavic.

SUBMITTED: June 3, 1957.

AVAILABLE: Library of Congress.

Card 3/3

KULAGIN, I.D.; NIKOLAYEV, A.V.

Determining current density in welding arc spots. Trudy Inst.met. no.3: 250-261 '58. (MIRA 12:3)

(Electric charge and distribution)

(Electric welding)

KULAGIN, I.D

135-58-4-17/19

AUTHOR: Tyul'kov, M.D., Candidate of Technical Sciences

TITLE: All-Union Scientific-Technical Conference on Welding in Shielding Gases (Vsesoyuznoye nauchno-tekhnicheskoye soveshchaniye po svarke v atmosfere zashchitnykh gazov)

PERIODICAL: Svarochnoye Proizvodstvo, 1958, Nr 4, pp 46-47 (USSR)

ABSTRACT: An All-Union scientific-technical conference on problems of arc welding in shielding gas was organized at Leningrad in December 1957 by the NTO Mashprom and the Commission of Coordination of scientific research work in welding attached to the Institut metallurgii AN SSSR (Institute of Metallurgy of the AS USSR). There were 425 representatives of plants, scientific research institutes, Vuzes and other organizations and guests from People's Democracies present. The Conference was opened by Professor K.V. Lyubavskiy, Doctor of Technical Sciences, Head of the welding section of the Tsentral'noye pravleniye NTO Mashprom (NTO Mashprom Central Administration). The Conference heard the following reports: A.V. Petrov, Candidate of Technical Sciences, on work carried out by NIAT in shielding gas

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135-58-4-17/19

All-Union Scientific-Technical Conference on Welding in Shielding Gases

welding; N.M. Novozhilov, Candidate of Technical Sciences, on the influence of initial material composition on joints welded in carbon-dioxide; V.N. Suslov, Candidate of Technical Sciences on "Metallurgical Problems Relating to the Welding in Carbon-Dioxide of Heat-Resistant Perlite Steel"; I.D. Kulagin, Candidate of Technical Sciences, on Peculiarities of the Effect of a Direct Current Arc in Gases on Electrode Surfaces"; M.D. Tyul'kov, Candidate of Technical Sciences, on the welding of movable and immovable tube butt joints without supporting rings; K.V. Vasil'yev, Candidate of Technical Sciences, on works carried out at VNIIAvtogen in gas shielded welding and on new metal cutting methods; M.N. Vishnevskiy, Engineer, on the application of atomic-hydrogen welding in industry; S.A. Segal', engineer, on "Comparative Investigations of Heat-Resistant Alloy Joints (EI602, EI435, EI703) Carried out by Argon-Arc and Electric Arc Welding"; A.G. Mazel', Candidate of Technical Sciences, on the work carried out at VNIIStroyneft' in the investigation of mechanical properties of low-carbon steel joints in welding with fusing electrodes in carbon-dioxide

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All-Union Scientific-Technical Conference on Welding in Shielding Gases 135-58-4-17/19

and methods of improvement; S.N. Valeyev, engineer, and A.V. Mordvintseva, Candidate of Technical Sciences, on the technology of welding steel alloys in gas shields; A.S. Fal'kevich, Candidate of Technical Sciences, on the carbon-dioxide welding of oil-gas pipes; I.I. Zaruba, Candidate of Technical Sciences on welding in gas shields carried out at the institut elektrosvarki imeni Ye.O. Patona AN USSR (Institute of Electrowelding imeni Ye.O. Paton, of the AS UkrSSR); O.V. Meshkova, engineer, I.P. Prosyankin, engineer, F.A. Chernakov and others on problems of argon-arc welding of light alloys; F.Ye. Tret'yakov, M.Kh. Shorshorov, Candidates of Technical Sciences, A.P. Goryatchev and D.A. Polyakov, Engineers, on welding of titanium; B.A. D'yachkov on power sources for welding with fusible and infusible electrodesdeveloped at VNIESO; S.M. Katler, Candidate of Technical Sciences on equipment for argon-arc welding with tungsten electrodes of aluminum alloys; A.S. Berman on new equipment for shielded gas welding; G.M. Kasprzhak, I.Ya. Rabinovich, Candidates of Technical Sciences, and Ye.I. Slepushkina, Engineer, on direct current power sources

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All-Union Scientific-Technical Conference on Welding in Shielding Gases 135-58-4-17/19

with universal characteristics for arc welding; V.A. Sinikov, Engineer, on "Equipment for Automatic Arc Welding with Carbon Electrodes in CO_2"; P.T. Dmitriyev, Engineer, on the automation of welding thin-walled, small-diameter, IKh18N9T-steel tubes under assembly conditions. Guests from Czechoslovakia, Poland and GDR delivered also reports. The Conference decided to request the USSR Gosplan to develop the production of welding equipment, accessory devices, and electrodes, to cut the costs of 99.95% pure argon, to take into consideration the need for semi-conductor material in equipment production and to increase the production of hose cables at the "Sevkabel'" Plant for semi-automatic welding in CO_2.

AVAILABLE: Library of Congress

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SOV/24-58-11-20/42

AUTHORS: Kulagin, I. D. and Nikolayev, A. V. (Moscow)

TITLE: Thermal Balance of a D.C. Welding Arc in Gases During the Period of Drop Formation (Teplovoy balans svarochnoy dugi postoyannogo toka v gazakh v period formirovaniya kapli)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 11, pp 89-91 (USSR)

ABSTRACT: During the process of burning of a welding arc a considerable part of the energy which is released in the near electrode regions is spent on fusion and evaporation of the electrode material. It was found in earlier work of the authors (Ref 1) that due to the considerable concentration of the arc energy in the anode and cathode spots, intensive illumination fluxes are emitted from the finer particles of the electrode material. These fluxes transmit a considerable part of the energy from one electrode to the other, which influences appreciably the energy distribution between the electrode and the component. The energy distribution between the electrode and the component is affected to a great extent by the transfer from the electrode to the component of large

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SOV/24-58-11-20/42

Thermal Balance of a D.C. Welding Arc in Gases During the Period of Drop Formation

drops of liquid metal. Thereby, the energy transfer by the light flux is continuous, whilst the energy transfer caused by the large drops is periodic and has a certain frequency. However, the drops of the liquid metal do not have a very high energy content and will not affect greatly the process of fusion of the parent metal. Therefore, for evaluating the process of penetration as well as the process of fusion of the electrode metal, it is of interest to investigate the thermal balance of the arc during the period of drop formation. The experiments related to a d.c. arc with a burning time of 0.03 to 0.7 sec, which is shorter than the time of separation of the drop from the electrode. The experiments have shown that the instantaneous thermal balance of the arc during this time remains practically constant. The investigations were carried out on a test-rig which enabled the following to be done simultaneously: measurement of the energy in the electrode and the component and of the radiation energy of the arc and also to photograph the arc. The heat in the electrode and in the component were measured separately

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SOV/24-58-11-20/42

Thermal Balance of a D.C. Welding Arc in Gases During the Period of Drop Formation

in two water calorimeters with variable temperature and an isothermal shell of a capacity of 150 millilitrês each. As a component a 37 mm dia., 12 mm high cylinder was used, whilst the electrode was a rod, 10 to 12 mm long, fixed in a steel cylinder of 37 mm dia. and 7 mm high. 0.5 to 1 sec after quenching the arc, the component as well as the electrode were placed into the calorimeters. The full radiation energy was measured in the direction perpendicular to the arc axis by means of a probe consisting of a copper disc with a welded-on thermocouple. The main experiments were effected for a Fe-Fe arc of direct and reverse polarity, 60 to 1300 A and an arc length of 2.2 to 20 mm; the electrodes were of 5 mm dia. A series of experiments were also carried out for determining the thermal balance of a W-Ti arc inside an argon atmosphere. The current intensity influences greatly the thermal balance of the arc. In a Fe-Fe arc of direct polarity burning in air 40 to 45% of the full power of the arc is released in the electrode and 30 to 37% in the component in the case of low current intensities up to about 150 A; for current

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SOV/24-58-11-20/42

Thermal Balance of a D.C. Welding Arc in Gases During the Period of Drop Formation

intensities of 300 to 3000 A the proportion of energy released in the electrode is reduced by 30-35% and that in the component is increased by 45-50%, Fig.1a. The observed redistribution of the arc energy between the electrode and the component is attributed to a change in the direction of the current flow; in the 60-150 A range the current was directed from the component to the electrode, whilst in the 300 to 1300 A range the current flowed in the opposite direction. In Fig.4 the influence is graphed of the length of the arc gap for a Fe-Fe arc. In Fig.5 the influence is graphed of the ambient medium on the thermal balance of a Fe-Fe arc.

There are 5 figures and 2 Soviet references.

SUBMITTED: July 1, 1958

Card 4/4

KULAGIN, I.D.; NIKOLAYEV, A.V.

Vysokotemperaturnyy dugovoy ionizirovannyy potok i oblasti ego vozmozhnogo primeniya.

report submitted for the 5th Physical Chemical Conference on Steel Production.

Moscow 30 JUN 1959

SOV/180-59-2-13/34

AUTHORS: Kulagin, I.D. and Nikolayev, A.V. (Moscow)

TITLE: Use of the Ionized Stream of an Electric Arc for Heating Materials (Primeneniye dugovogo ionizirovannogo potoka elektricheskoy dugi dlya nagreva materialov)

PERIODICAL: Izvestiya Akademii nauk, SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 2, pp 78-81 (USSR)

ABSTRACT: A stream of ionized particles with high-speeds, temperatures and energy contents can be separated from spark and arc discharges (Refs 1 and 2). For producing a stream of ionized particles the authors have used an arc discharge of appreciable length passing between electrodes in the form of a rod and a ring in an electrically neutral channel through which gas is passed. The ionized stream emerges from the ring (Fig 2), which has an inner diameter of 5 mm and is water cooled. Tests were carried out with the following ranges of conditions: distance from tip of rod electrode to outer surface of ring, 0 - 27 mm; arc current, 7 - 90 amp; gas flow, 170 - 870 litres/hour. Using a calorimetric specimen the effective heating power was determined and the efficiency of heating was taken as the ratio of this

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SOV/180-59-2-13/34

Use of the Ionized Stream of an Electric Arc for Heating Materials

to 0.24 times the voltage-current product for the arc in the channel. Fig 3 shows the heating power (cal/sec) and efficiency as functions of the rod-to-ring distance (curves a and b), respectively). Efficiency is practically independent of this distance. The effective heating power is, to a first approximation, directly proportional to current (Fig 4a) but efficiency decreased (Fig 4b). Fig 5 shows the heating power and efficiency as functions of argon flow (a and 6, respectively): efficiency increases to 30 - 32% at a flow of 500 - 600 litres/hr, remaining at this value at higher flows. With 86% helium - 14% argon mixture the heating power was almost doubled that with pure argon, but efficiency remained practically unchanged; neither heating power nor efficiency was appreciably affected by replacing the tungsten electrode by carbon or by changing electrode diameter in the range 1.3 - 3 mm (table). The authors point out that the ionized stream can provide a heat flow approximating to that obtained by direct arc

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SOV/180-59-2-13/34

Use of the Ionized Stream of an Electric Arc for Heating Materials

welding; by suitable control of its degree of concentration it can be used for welding and cutting on the one hand and metallization, brazing, surface hardening, dressing and deseaming.

There are 5 figures, 1 table and 3 Soviet references.

ASSOCIATION: Institut Metallurgii Akademii Nauk SSSR (Institute of Metallurgy of the Academy of Sciences of the USSR)

SUBMITTED: December 23, 1958

Card 3/3

18(5,7) SOV/135-59-9-1/23

AUTHOR: Kulagin, I. D., Candidate of Technical Sciences and Nikolayev, A. V., Engineer

TITLE: Arc Plasma Jets as a Heat Source During Material Treatment

PERIODICAL: Svarochnoye proizvodstvo, 1959, Nr 9, pp 1-4 (USSR)

ABSTRACT: The article presents a method and design of a device to produce plasma jets. These shall be used as an independent heat source. The author also discusses in which cases they can be used in the treatment of different metals. In the active spots of the arc the high current density causes a fast heating and evaporation of the electrode material. The vapors, which are ionized in the area near the electrode, move with high speed from the electrode and form a brightly luminous jet, with a length up to 15-20 mm and more (Fig 1). The spectrum research was made by N. N. Sobolev, who showed, that the jet mainly consists of ionized atoms of the electrode material. The speed of jet corpuscles can reach 300-1000 m/sec. The temperature of the jet is about

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SOV/135-59-9-1/23

Arc Plasma Jets as a Heat Source During Material Treatment

10,000°C at a distance of 2-3 mm from the electrode end, and about 6,000°C at a distance of 6-8 mm. There is always a considerable ionization of the atoms. Fig 2 shows the heat and mechanic characteristics of the jet within an argon atmosphere. Fig 3 shows two principal schemes of a device which produces arc plasma jets. In the Institut metallurgii AN SSSR (Institute of Metallurgy of AS USSR) four types of arc plasma jet producing devices were constructed: IMET-101 for the research of the devices energetic parameters, IMET-102 for use by hand (Fig 6), IMET-103 and IMET-104 for machine-driven use. Fig 7 shows how the heat power, effective efficiency and arc voltage depend: 1) on the nozzle arrangement on the surface which is to be heated and 2) from the cavity of the core electrode. The authors state that there are great possibilities for using an arc plasma jet for the welding of sheet materials, including heat resistant metals. Especially efficient is the use of plasma jet for soldering. There are 4 photographs, 1 drawing, 2 graphs, 1 table and 4 Soviet

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SOV/135-59-9-1/23

Arc Plasma Jets as a Heat Source During Material Treatment

references.

ASSOCIATION: Institut metallurgii imeni A. A. Baykova AN SSSR (Institute of Metallurgy imeni A. A. Baykov AS USSR)

Card 3/3

33811

12300

S/137/62/000/001/090/237
A052/A101

AUTHORS: Rykalin, N.N., Kulagin, I.D., Shorshorov, M. Kh.

TITLE: Calculation of dimensions of the fusion zone produced by the surface arc and the welding burner flame

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 1, 1962, 4-5, abstract 1E22 (V sb. "Protsessy plavleniya osnovn. metalla pri svarke", Moscow, AN SSSR, 1960, 71 - 100)

TEXT: The calculation is based on the scheme of a normal-circular heat source moving with a finite speed over the surface of a semi-infinite body. The calculation coefficients are determined from a comparison of the calculation data with the experiment. Conclusions: 1) The dimensions of the fusion zone produced by the surface arc and the welding burner flame can be conveniently determined from the width of the fusion isotherm, computed analytically, and also from experimental dependences of the relative depths (the ratio of the fusion zone depth to its width) and the space coefficient μ (the ratio of the fusion zone area to the product of its width by depth) on the welding parameters. 2) The width of the fusion zone, especially for unsunken (superficial) arc and flame,

X

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33811

Calculation of dimensions ... S/137/62/000/001/090/237
A052/A101

depends on the distribution of the heat flow of the source. For the open arc welding with currents up to 250 - 300 a, and an argon-shielded arc gas flame the adopted calculation scheme provides fair results. 3) The calculation of the fusion zone width carried out by this scheme at the arc and torch welding of sheets of a finite thickness describes satisfactorily the experiment, provided that the heat reflection from the lower (unheated) sheet surface does not affect the fusion zone dimensions. 4) The calculation of the fusion zone width at the arc and torch welding of sheets of a finite thickness with an allowance for the heat reflection from the lower sheet surface is a very labor-consuming one. Therefore it is advisable to allow for the effect of the heat reflection by means of a conventional mean heating temperature of the welded sheets, which is determined by comparing the calculation with the experiment.

V. Tarisova

[Abstracter's note: Complete translation]

Card 2/2

KULAGIN, Ivan Dmitriyevich, kand.tekhn.nauk; SHASHKOV, Andrey Nikolayevich, kand.tekhn.nauk; UMNYAGIN, Mikhail Grigor'yevich

Specialists answer questions about welding. Tekh. mol. 28 no. 12:7-10 '60. (MIRA 13:12)

1. Institut metallurgii imeni A.A.Baykova AN SSSR. (for Kulagin). 2. Direktor Vsesoyuznogo nauchno-issledovatel'skogo instituta avtogennoy obrabotki metallov (for Shashkov). 3. Direktor Vsesoyuznogo proyektno-tekhnologicheskogo instituta tyazhelogo mashinostroyeniya (for Umnyagin).

(Welding)

44022
S/860/61/000/000/018/020
A006/A101

12300

AUTHORS: Kulagin, I. D., Nikolayev, A. V.

TITLE: A torch for heat-treatment of various materials (welding, soldering, cutting, etc)

SOURCE: Sbornik izobreteniy; svarochnaya tekhnika. Kom. po delam izobr. i otkrytiy. Moscow, Tsentr. byuro tekhn. inform., 1961, 176 (Authors' Certificate no. 121889, cl. 21h, 30_{01}; no. 614253 of December 18, 1958)

TEXT: A torch is proposed for welding, cutting and soldering metals with an electric arc of indirect action. The arc burns in a gas flow between a rod electrode and a ring-shaped, water-cooled electrode, which is placed at the tip of a water-cooled nozzle with a central conduct. The position and direction of the rod electrode can be regulated. The torch is equipped with three connection pieces for the gas and water supply, and water evacuation. The arc is excited by short-circuiting the electrodes with an auxiliary carbon electrode after their approach. The arc can also be excited by auxiliary, high-voltage high-frequency

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A torch for heat-treatment of... S/860/61/000/000/018/020
A006/A101

discharge. Argon, helium or their mixtures are used as shielding gas. The new torch is recommended by VNIIESO. There is 1 figure.

X

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21009

11110 also 1573

S/135/61/000/005/001/011
A006/A101

AUTHORS: Kulagin, I. D.; Petrunichev, V. A., Candidates of Technical Sciences, and Nikolayev, A. V., Engineer

TITLE: Investigating the cutting with arc plasma jet singled out from a cathode flame

PERIODICAL: Svarochnoye proizvodstvo, no. 5, 1961, 1-4

TEXT: A plasma jet is used for severing and surface-planing of different materials. The plasma jet is produced by discharge of an arc excited between tungsten electrode 1 and water cooled copper nozzle 2 (Fig. 1), (Ref. 1, 2). Gas is blown through the nozzle along the cathode flame which is ionized and leaves the nozzle in the form of a bright plasma jet attaining temperatures of 10,000 - 15,000°C and more. Of the two existing methods of plasma cutting, namely with the use of a plasma arc, singled out from or coinciding with the cathode flame, the authors selected the second method to investigate the heat characteristics and the cutting properties of the plasma arc. The information includes the designing of a plasma torch developed for the cutting of a number of materials. The efficiency of the cutting process depends considerably on the effective

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A006/A101

Investigating the cutting with arc plasma ...

power and the cutting properties of the plasma jet which are determined by the arc current and voltage, gas consumption and composition, length and diameter of the nozzle channel and the distance of the nozzle from the surface to be cut (Fig. 2 and 3). Maximum efficiency of plasma arc cutting is assured by maximum possible welding current and arc voltage, least possible distance of the nozzle from the surface of the sheets to be cut, minimum length of the nozzle channel, and optimum gas consumption and nozzle diameter. The cutting rate can be increased by using gases or gas mixtures of high ionization potentials. Comparison data on the cutting rate by various methods are given in a table. Plasma arc cutting with a jet singled out from the cathode flame can be employed for cutting various non-electric conducting materials, such as refractory bricks, concrete, granite, carborundum etc. The process can be performed either manually or automatically. According to data submitted by engineer V. P. Norenko of Kramatorsk at the Moscow Welding Conference in March 1960, the method assures satisfactory properties of the cut when preparing stainless steel sheets for welding. On the basis of IMET-104 torch, an improved design - the ИМЭТ-106 (IMET-106A) torch was developed in 1960, intended for automatic and manual cutting, at 300 - 350 amp current and 15 kw maximum power. The water-cooled adapter contains a screwed-in nozzle with a conical contact surface and threaded lower section (Fig. 6).

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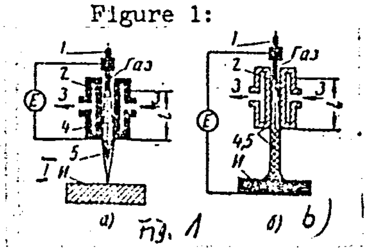
The minimum wear of the nozzle is 0.01 . 0.02 g/kw-hr when using argon. The tôrch and its connection system are shown in Figures 5 and 7. It can be employed for metal cutting with both an arc singled out from or coinciding with the cathode flame. The cutting process is stable and no special equipment is needed. The torch can be mounted on any oxygen cutting assembly and will prove most suitable for manual cutting of up to 10 - 15 mm thick metals.

Figure 1:

Schematic representation of plasma cutting process: a - with plasma jet singled out from the cathode flame; b - with plasma jet coinciding with the cathode flame; 1 - electrode; 2 - nozzle; 3 - cooling water; 4 - cathode flame; 5 - plasma jet. E - current feed source; I - work piece; 1 - sinking of the arc into the channel

Figure 1:



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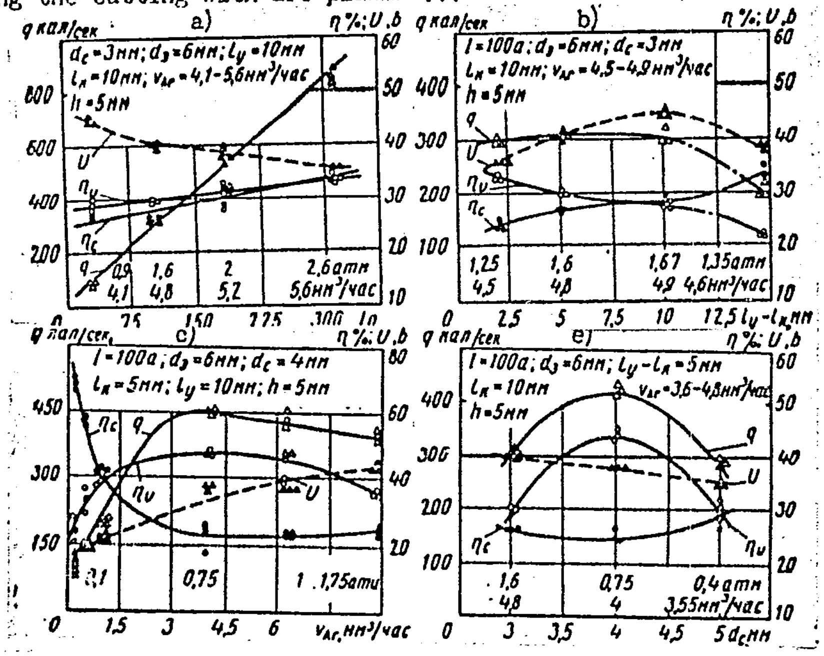
S/135/61/000/005/001/011
A006/A101

Investigating the cutting with arc plasma ...

Figure 2:



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Investigating the cutting with arc plasma ...

Figure 2 continued:

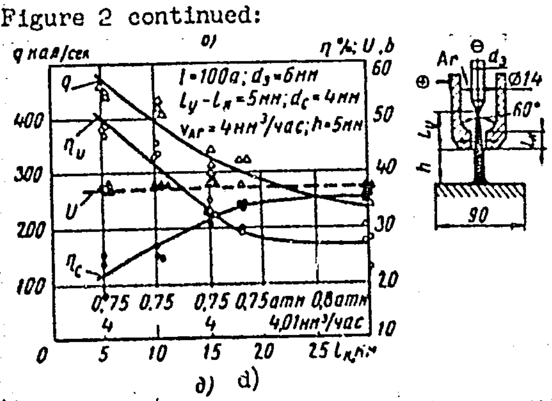

Figure 2:
The effect on the effective thermal power q of the plasma jet, singled out from the cathode flame; on the effective efficiency η_u of the plasma heating of the part; on the relative power η_n liberated in the nozzle, and on the arc voltage U, of: a - arc current I; b - electrode sinking l; c - argon consumption V_{Ar}; d - nozzle diameter d_c; e - length of nozzle channel l_{ch}.

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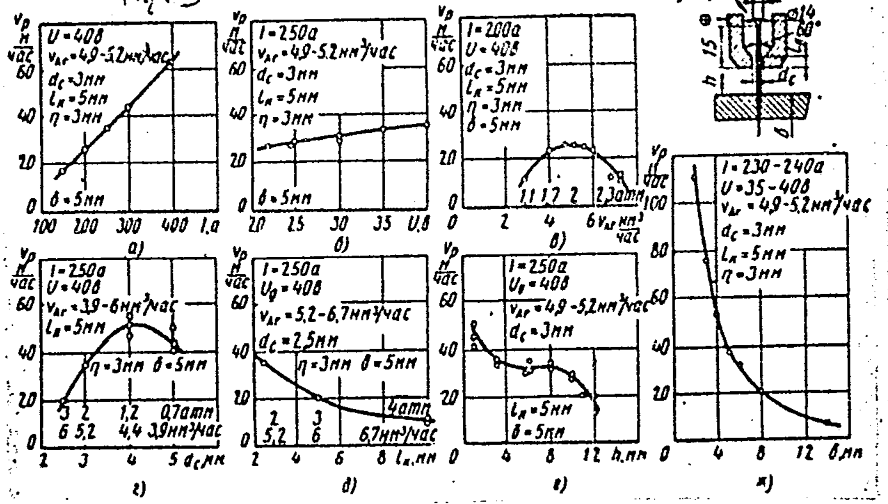
Investigating the cutting with arc plasma...

Figure 3: The effect of basic parameters on the speed of cutting stainless steel with a plasma jet singled out from the cathode flame of: a - arc current I; b - arc voltage U; c - consumption (pressure) of argon V_{Ar}; d - nozzle diameter d_n; e - length of nozzle channel l_{ch}; f - distance from nozzle to surface to be cut h; g - thickness of sheets to be cut δ.

Fig. 3



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A006/A101

Investigating the cutting with arc plasma...

Table:

Speed of plasma cutting of metals in m/h

Cutting method	Material	Material thickness in mm							
		6	10	12	20	30	40	50	60
Plasma jet coinciding with cathode flame (Ref 5)	Aluminum *	-	450	-	130	80	50	35	-
	Stainless steel **	-	80	-	50	30	20	15	12
	Copper **	-	50	-	20--30	12--15	8--10	-	5--6
Plasma jet singled out from cathode flame	Stainless steel ***	80	55	-	30	15	12	-	6

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Investigating the cutting with arc plasma...

Table continued:

Oxygen-flux cutting (Ref 4, 7)	Stainless steel	21	20	19	18	-	-	12	-
	copper	9.6	7.8	7.2	4.8	2.6	-	1.3	-
Oxygen cutting (Ref 4,7)	Carbon steel	36	33	31	27	24	20	-	16

*) Cutting in a hydrogen-argon mixture at 1:1 volumetric ratio; consumption 3 m^3/h.

**) Cutting in commercial hydrogen; consumption 3 m^3/h.

***) Cutting in a mixture of argon with 20 volume % nitrogen, consumption 2.5 m^3/h, current 250 amp, voltage 45 v.

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A006/A101

Investigating the cutting with arc plasma...

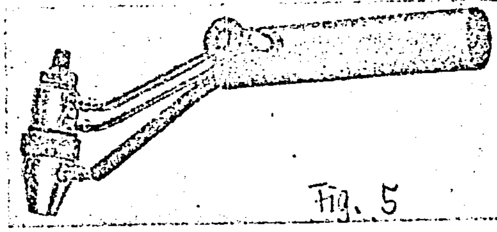

Fig. 5

Figure 5:
External view of IMET-106A arc plasma torch

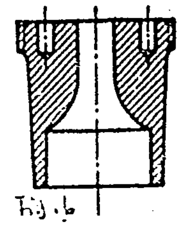

Fig. 6

Figure 6:
Longitudianl section of an exchangeable screwed-in nozzle of IMET-106A torch

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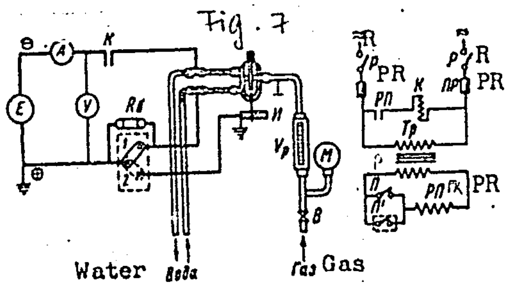
A006/A101

Figure 7:

Connection circuit diagram of IMET-106A plasma torch; I - work piece; M - manometer; V_r - rotarymeter of operational gas; R_b - ballast rheostat; A and V - amperemeter and voltmeter; E - feed source; K - contactor; RP - intermediate relay; V - switch; PR - fuse; R - knife switch.



There are 7 figures, 1 table and 7 Soviet references

ASSOCIATION: Institut metallurgii im. A. A. Baykova, AN SSSR (Institute of Metallurgy imeni Baykov, AS USSR)

Card 10/10

KULAGIN, I.D., RYKALIN, N.N. AND NIKOLAYEV, A.V.

"Thermal and mechanical gas-shielded arc characteristics."

Report submitted for the Autumn Meeting of the Welding Research Institute.
London, England, 29 Oct-2 Nov 1962.

RYKALIN, N.N.; KULAGIN, I.D.; NIKOLAYEV, A.V.

Thermal characteristics of the interaction between a flow of plasma and the solid being heated. Avtom. svar. 16 no.6:3-13 Je '63. (MIRA 16:7)

1. Institut metallurgii im. A.A.Baykova.
(Plasma (Ionized gases)) (Heat--Transmission)

RYKALIN, N.N.; ZARUBA, I.I.; KULAGIN, I.D.

Symposium on the physics of the welding arc. Avtom.svar. 16 no.5:91-94 My '63. (MIRA 16:12)

L 6617-65 EWT(m)/EPF(n)-2/EPR/EWP(k)/EWP(q)/EWP(b) Pf-4/Ps-4/Pu-4 SSD/AFWL/ AEDC(b)/ASD(p)-3/AFETR/ESD(si)/ESD(t) JD/JG

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ACCESSION NR: AP4043926 S/0279/64/000/004/0166/0166

AUTHOR: Kulagin, I. D. (Moscow); Kudinov, V. V. (Moscow); Petrunichev, V. A. (Moscow)

TITLE: Refractory and active metal powders with globular particles

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 4, 1964, 166-166

TOPIC TAGS: metal powder, refractory metal powder, active metal powder, globular particle powder, powder particle size, plasma jet, argon plasma jet, plasma jet atomizing, plasma jet metal atomizer

ABSTRACT: A method for making refractory and active metal powders with globular particles which are suitable for making porous parts, operating under conditions of high temperature, high gas velocities, and in corrosive media is suggested. Equipment was designed on the basis of experiments with tungsten, molybdenum, tantalum, niobium, titanium, and tungsten-hafnium alloys. According to this method a wire is melted and atomized by a plasma jet. Liquid particles blown by the hot jet acquire, under the effect of surface tension, the shape of a globule. This method yields powders which contain 18% of par-

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L 6617-65
ACCESSION NR: AP4043926

ticles of a size 400—315 μ; 41%, 315—250 μ; 30%, 250—160 μ; 10%, 160—63 μ; and 1%, under 63 μ. Density of loose powder is 58% and can be increased to 61—64% by shaking. Chemical composition of globules corresponds to that of the wire used. In processing refractory metal it is possible to obtain globular particles of a size ranging from tenths of a micron to dozens of microns. Under certain conditions it was found possible to produce hollow globular particles. The yield of globular particles in a finished product reaches at least 90%. The purity of powders produced in argon plasma is not inferior to that of the initial metal. Orig. art. has: 1 table.

ASSOCIATION: None

SUBMITTED: 05Mar64 ATD PRESS: 3094 ENCL: 00

SUB CODE: MM NO REF SOV: 000 OTHER: 000

Card 2/2

S/0125/64/000/006/0033/0038

ACCESSION NR: AP4039767

AUTHOR: Kudinov, V. V.; Kulagin, I. D.

TITLE: Stability of constrained arc discharge in the channel of an electro-conducting nozzle

SOURCE: Avtomaticheskaya svarka, no. 6, 1964, 33-38

TOPIC TAGS: metal cutting arc, double arc, plasma arc, arc cutting, cutting arc stability

ABSTRACT: In an "open-anode" metal-spraying device (see Enclosure 1), two arcs may strike when the voltage drop across arc 1 becomes higher than or equal to the sum of voltage drops across closed arc 3 and open arc 2. Among other factors, the drop in arc 3 depends on the argon rate-of-flow. Double arcing usually results in the destruction of the nozzle because of a sharp rise in the current. It is shown that the maximum permissible arc length in the nozzle

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ACCESSION NR: AP4039767

channel depends on the arc-voltage gradient (16 v for copper). External and current-voltage characteristics of the arc were studied on an IMET-108 flame-metal-spraying outfit. It was found that a reduction in the nozzle diameter to 2-3 mm tends to raise the voltage gradient (up to 10 v/mm) along the arc situated in the nozzle channel, which may result in double arcing. The experimental data obtained permits designing a plasma torch not liable to double arcing. Orig. art. has: 5 figures, 2 formulas, and 3 tables.

ASSOCIATION: IMET im. A. A. Baykova (Institute of Metals)

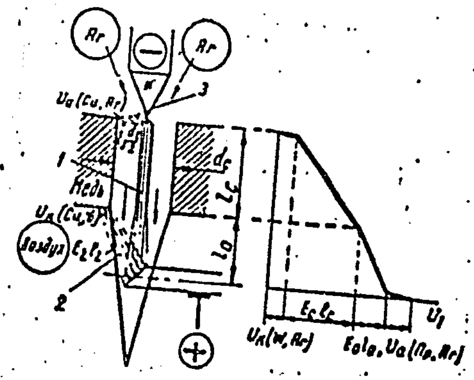
SUBMITTED: 15Jul63 DATE ACQ: 24Jun64 ENCL: 01

SUB CODE: MM NO REF SOV: 005 OTHER: 003

Card 2/3

ACCESSION NR: AP4039767

ENCLOSURE: 01



The arc column is situated in the conducting channel and the anode spot, on the wire ("open-anode" metal spraying). Left - double arcing; right - arc voltage drop diagram

Card 3/3

RYKALIN, N. N. Prof, Dr. Tech Sci; KUDINOV, V. V. Cand Tech Sci; KULAGIN, I. D. Card Tech Sci

"Heat efficiency of smelting process by plasma arc and plasma jet cutting"

report presented at 18th Annual Assembly, Intl Inst of Welding, Paris, 5-10 Jul 1965.

L 54500-65 EWP(e)/EWT(m)/EPF(n)-2/EWP(t)/EWP(k)/EWP(z)/EWP(b) Pf-4/Pu-4
IJP(c) JD/JG

ACCESSION NR: AP5013112 UR/0370/65/000/002/0088/0094
669 : 621.762.001

AUTHOR: Petrunichev, V. A.; Kudinov, V. V.; Kulagin, I. D.

39
B

TITLE: Producing spherical metal powders by vaporizing wire

SOURCE: AN SSSR. Izvestiya. Metally, no. 2, 1965, 88-94

TOPIC TAGS: powder metallurgy, spherical metallic powder, exploding wire, wire vaporization, metal vaporization

ABSTRACT: Use of a plasma arc to spray vaporized W, Ta, Nb, Ti and other high melting metals into contact with a water bath was studied in the search for a more effective method of producing fine spherical metal powders. Powders from 50-500 μ were produced, the bulk of the distribution falling between 150 and 300 μ. The authors attained production of 10-12 Kg/hr of tungsten powder with greater than 90% having spherical shape. Variations in rate and changes in particle temperature were analyzed to explain the mechanism by which the particles are rounded, and to establish the range of spacing between spray nozzle and receiver in which the particles are not deformed by impact with the surface of the liquid. A formula is

Card 1/2

L 54500-65

ACCESSION NR: AP5013112

proposed for evaluating the effect of various parameters of the plasma spraying system on particle dimensions and for approximating particle size of the major frac- [illegible] ...persion of the spray from the wire is the easiest experimental variable to [illegible] ...nging the current in the arc and the [illegible] of the wire. Increased current and diminished wire diameter provide spherical powders with finer particle size. Orig. art. has: 7 figures, 4 formulas.

ASSOCIATION: none

SUBMITTED: 14Jun64 ENCL: 00 SUB CODE: MM, IE

NO REF SOV: 007 OTHER: 000

Card 2/2

L 61912-65 EWT(l)/EWP(e)/EWT(m)/EPF(c)/EWP(i)/EPF(n)-2/EWG(v)/EWP(j)/EWP(t)/
EWP(b)/EWA(l)/EWC(m)/EPA(w)-2 Pz-6/Pc-4/Po-4/Pe-5/Pr-4/Ps-4/Pi-4/Pu-4 RPL/
ACCESSION NR. AP5016014 IJP(c) IG/WW/JD/ UR/0125/65/000/006/0001/0005 86
JW/AT/JAJ/RM 621.791.85
B 82

AUTHOR: Rykalin, N. N. (Corresponding member AN SSSR); Nikolayev, A. V. (Candidate of technical sciences); Kulagin, I. D. (Candidate of technical sciences)

TITLE: Calculation of heat flow during heating of a solid in a plasma stream 21

SOURCE: Avtomaticheskaya svarka, no. 6, 1965, 1-5

TOPIC TAGS: heat conductivity, ablative heat transfer, plasma arc, argon, mathematical analysis, copper 21

ABSTRACT: A method is presented for the determination of maximal heat flow in the center of a heat spot for a plasma stream. The calculation is based on equations obtained by Feye and Riddell for heat flow at a critical point, for the case of an equilibrium boundary layer. The possibility for determining maximal heat loss is shown as a function of average mass enthalpy and the temperature of an argon plasma stream. A graph shows the impingement of the plasma stream upon a copper surface, along with several parameters: tangential and normal speeds, temperature, and enthalpy. These are plotted as a function of distance from the heat spot. The equa-

L 61912-65

ACCESSION NR: AP5016014

4

tions of Feyu and Riddell were used, and were altered to suit the boundary conditions for this special case. These were then used to obtain graphs of heat flow from the hot point as a function of the axial temperature of the plasma stream for various values of the parameter m/d_c^3 (m is mass flow of argon, kg/sec; d_c is diameter of the channel in meters). Heat flow increased with temperature and was lower, the lower the value of m/d_c^3. 15 Ablation effects resulting from vaporization of Cu were included in the calculations. Changes in the axial and the central mass temperatures were determined relative to the maximal heat flow and the energy balance of the plasmatron as a function of current strength, length of arc, gas velocity, and channel diameter. Also, the dependence of the axis temperature divided by the central mass temperature of the plasma stream, was plotted as a function of enthalpy. Orig. art. has: 4 figures.

16

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 06Jan65 ENCL: 00 SUB CODE: MM, TD

NO REF SOV: 009 OTHER: 005

dm

Card 2/2

L 12135-66 EWT(1)/ETC(F)/EPF(n)-2/EWG(m)/ETC(m) IJP(c) WW/AT

ACC NR: AP6001910 UR/0294/65/003/006/0871/0878

AUTHOR: Rykalin, N.N.; Nikolayev, A.V.; Kulagin, I.D.

44,55 44,55 44,55

65

ORG: Institute of Metallurgy im. A.A. Baykov (Institut metallurgii)

44,55

B

TITLE: Heat flux in a body interacting with a plasma jet

21,44,55

SOURCE: Teplofizika vysokikh temperatur, v.3, no.6, 1965, 871-878

TOPIC TAGS: heat flux pickup, plasma jet, arc discharge, argon

ABSTRACT: The article establishes the distribution of the specific heat flux in the heating of the surface of an object by a plasma jet under sub-ablation conditions. The density of the heat flux in the reaction zone of an argon plasma jet was determined by calorimetric methods. The plasma was generated in an IMET-105 generator in which the channel of the arc chamber was electrically insulated from the nozzle (anode). The plasma-forming gas was fed coaxially with the arc. The sensing device for measurement of the heat flux distribution was a steel plate with dimensions of 120 x 80 x 6 mm with built-in sensitive elements (diagram shown in article). Measurements were made during the experiments at intervals of from 0.3 to 2 sec. The measurements of the heat flux were made with a distance of 10 mm between the pick-up and the nozzle of the

UDC: 533.915

L 12135-66

ACC NR: AP6001910

plasmatron. The pressure was measured with a water manometer. Based on a previously published equation for an equilibrium boundary layer, the article proposes a method for estimating the heat flux at the critical point, and demonstrates the possibility of estimating the maximum heat flux from averaged values of the enthalpy and the temperature of the argon plasma jet. Orig. art. has: 4 formulas and 6 figures.

SUB CODE: 20/ SUBM DATE: 05Jan65/ ORIG REF: 011/ OTH REF: 004

Card 2/2

KUDINOV, V.V.; KULAGIN, I.D.

Thermal effectiveness of the melting process during enclosed arc cutting. Avtom. svar. 18 no.8:1-5 Ag '65. (MIRA 18:11)

1. Institut metallurgii imeni Baykova, Moskva. Submitted November 27, 1964.

L 02965-67 EWT(m)/EWP(v)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/HM

ACC NR: AP6032551 (A) SOURCE CODE: UR/0125/66/000/009/0011/0015

44
40
B

AUTHOR: Krasulin, Yu. L.; Kulagin, I. D.

ORG: Institute of Metallurgy im. Baykov (Institut Metallurgii)

TITLE: Controlling the temperature of the melting pool in plasma-arc metal deposition 14

SOURCE: Avtomaticheskaya svarka, no. 9, 1966, 11-15

TOPIC TAGS: ~~plasma~~ arc welding, plasma arc, metal deposition 14

ABSTRACT: The temperature of the melting pool in plasma arc welding can be controlled by employing a current carrying filler wire (see Fig. 1). The source of heat in this system is the indirect double arc. One arc is between tungsten electrode 1 and nozzle 2, and the other is between the electrode and current-carrying filler wire 6. The arc between the tungsten electrode and the filler wire produces a plasma jet with a drop transfer of molten filler wire metal. The intensity of this jet can be

Card 1/2

UDC: 621.791.92:536.5

L 02905-67

ACC NR: AP6032551

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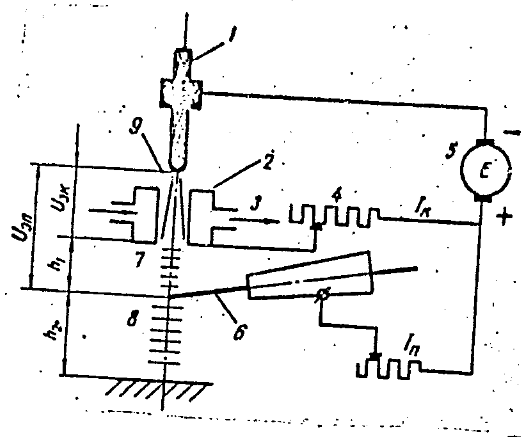

Fig. 1. Plasma-arc metal deposition with current-carrying filler wire

1 - Tungsten electrode; 2 - water-cooled nozzle; 3 - water; 4 - RB-300 ballast rheostat; 5 - PS-500 generator; 6 - filler wire; 7 - plasma stream; 8 - plasma flare with molten filler wire; 9 - plasma-forming gas.

controlled by varying the current in the filler wire. Thus, the temperature of molten metal and also that of the base metal can be regulated in a very wide range. Orig. art. has: 7 figures and 1 table.

SUB CODE: 11, 13/ SUBM DATE: 01Dec65/ ORIG REF: 009/ OTH REF: 001/
ATD PRESS: 5099

Card 2/2 JC

ACC NR: AP7004632 (N) SOURCE CODE: UR/0288/66/000/003/0027/0036

AUTHOR: Nikolayev, A. V.; Kulagin, I. D.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Energy characteristics of a plasmatron with a magnetically stabilized arc

SOURCE: AN SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya tekhnicheskikh nauk, no. 3, 1966, 27-36

TOPIC TAGS: plasma arc, plasma research, plasma discharge, charged particle, particle motion, plasmatron

ABSTRACT: In order to determine the effect of the operating parameters of a magnetically stabilized plasmatron on its energy characteristics, a plasma arc burning between two parallel electrodes in crossed magnetic B and electric E fields is studied. It is assumed that the arc column is isothermal and that a Lorentz force acts on the column ions and electrons as a result of which the charged particles move along a cycloid in the direction of vector [EB]. Because of this, the charged particles, in addition to the thermal motion, will have ordered velocity components in two directions only. In all other directions the charged particle drift, caused by the E and B fields, will be equally probable. Therefore, in considering the momentum balance such a particle motion is neglected. The velocity of charged particles at the boundary of the plasma arc is determined by the ambipolar diffusion of electrons and ions. On the basis of the above considerations expressions are